

CLAIMS

1. Liquid treatment apparatus for providing a flow of pressurized liquid, said apparatus comprising, in combination:

a hydraulic cylinder defining a cylinder interior;

a divider dividing said cylinder interior into first and second compartments;

a first piston head within said cylinder interior, said first piston head being movably mounted in said first compartment and forming a liquid-tight seal with said hydraulic cylinder to subdivide said first compartment into a first set of two subcompartments, said subcompartments of said first set of two subcompartments located at opposed sides of said first piston head;

a second piston head within said cylinder interior spaced from said first piston head, said second piston head being movably mounted in said second compartment and forming a liquid-tight seal with said hydraulic cylinder to divide said second compartment into a second set of two subcompartments, said subcompartments of said second set of two subcompartments located at opposed sides of said second piston head;

a double-ended ram member movably mounted within said cylinder interior and located between said first piston head and said second piston head, with a first end of said ram member unattached to but engageable with said first piston head within a single subcompartment of said first set of two subcompartments and a second end of said ram member unattached to but engageable with said second piston head within a single subcompartment of said second set of two subcompartments, said ram member extending through said divider, movable relative to said divider, and forming a fluid-tight seal with said divider;

first liquid flow path defining means defining a first liquid flow path extending between the two subcompartments of said first set of two subcompartments;

second liquid flow path defining means defining a second liquid flow path extending between the two subcompartments of said second set of two subcompartments;

pressurized liquid delivery means having an outlet for pressurized liquid;

control means for alternately introducing pressurized liquid from said pressurized liquid delivery means outlet into said first and second compartments to cause reciprocal movement of said piston heads and ram member within said cylinder interior and pressurization and flow of liquid through said liquid flow paths from the subcompartments of the sets of two subcompartments not accommodating a ram member end to their respective subcompartments accommodating a ram member end; and

liquid exit path defining means defining a liquid exit path communicating with said liquid flow paths for discharging excess pressurized liquid from the subcompartments not accommodating a ram member end and not entering the subcompartments accommodating a ram member end.

2. The apparatus according to Claim 1 additionally comprising filter means operatively associated with said first and second liquid flow path defining means for receiving pressurized liquid from said first and second liquid flow paths and filtering said pressurized liquid.

3. The apparatus according to Claim 2 wherein said filter means is operable to separate the pressurized liquid received from said first and second liquid flow paths into a permeate portion and a concentrate portion, said filter means having a permeate portion exit and a concentrate portion exit.

4. The apparatus according to Claim 3 wherein said filter means is in said liquid exit path and wherein said excess pressurized liquid comprises said permeate portion.

5. The apparatus according to Claim 2 wherein said filter means comprises a reverse osmosis filter.

6. The apparatus according to Claim 1 wherein said control means includes valve means for alternatively directing pressurized liquid from said liquid delivery means outlet to the subcompartments of the sets of two subcompartments not accommodating a ram member end.

7. The apparatus according to Claim 6 wherein said valve means includes a pilot valve alternately actuated in response to movement of said first and second piston heads and movable between a first pilot valve position and a second pilot valve position.

8. The apparatus according to Claim 7 additionally comprising a retrack valve in operative association with said pilot valve and with said first and second liquid flow path defining means to alternately open and close said first and second liquid flow paths responsive to positioning of said pilot valve.

9. The apparatus according to Claim 8 wherein said retrack valve defines at least one outlet for draining liquid from the subcompartments accommodating a ram member end.

10. The apparatus according to Claim 9 including means for recirculating liquid drained from the subcompartments accommodating a ram member end.